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I'd Rather be Hanged for a Sheep than a Lamb
The Unintended Consequences of 'Three-Strikes' Laws

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Abstract
Strong sentences are common "tough on crime" tool used to reduce the incentives for individuals to participate in criminal activity. However, the design of such policies often ignores other margins along which individuals interested in participating in crime may adjust. I use California's Three Strikes law to identify several effects of a large increase in the penalty for a broad set of crimes. Using criminal records data, I estimate that Three Strikes reduced participation in criminal activity by 20 percent for second-strike eligible offenders and a 28 percent decline for third-strike eligible offenders. However, I find two unintended consequences of the law. First, because Three Strikes flattened the penalty gradient with respect to severity, criminals were more likely to commit more violent crimes. Among third-strike eligible offenders, the probability of committing violent crimes increased by 9 percentage points. Second, because California's law was more harsh than the laws of other nearby states, Three Strikes had a "beggar-thy-neighbor" effect increasing the migration of criminals with second and third-strike eligibility to commit crimes in neighboring states. The high cost of incarceration combined with the high cost of violent crime relative to non-violent crime implies that Three Strikes may not be a cost-effective means of reducing crime.

Keywords: three strikes, deterrence, sentencing
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1. INTRODUCTION

The high crime rates of the 1980s coupled with the belief that prison served as a "revolving door" for criminal activity, prompted new sentencing laws aimed at increasing sentences for repeat offenders. One of the most publicized new policies was habitual offender law, commonly called "Three-Strikes You're Out". This paper uses California's version of this law to estimate how criminals respond to changes in sentencing policy. California's Three Strikes law changed the penalty structure in two ways: it increased the expected penalty for all crimes (intercept shift), and flattened the penalty gradient with respect to severity of crime (slope shift). I develop a model in which the increase in the intercept has the expected effect of decreasing crime levels, while the gradient shift has the unanticipated consequence of encouraging a shift toward more serious crime. I empirically examine the relative magnitude of these two effects using California's Three Strikes law. The results suggest that Three Strikes reduced the overall level of crime but increased the propensity to commit violent crime. Depending on the societal preferences regarding the cost of non-violent and violent crimes, such offsetting distributional effects may substantially reduce the benefits of broad enhancements in sentencing. In addition I find that some of California's reduction comes at the expense of other states. This further suggests that single-state enhancements may be more costly from a national perspective than previously believed.

In part because of the high publicity surrounding the law and in part because it remains among the most striking examples of across-the-board sentence enhancements, there has been an extensive literature aimed at estimating the overall effect of Three Strikes law. Early work by Greenwood et al (1994) estimated huge costs and limited deterrence from the law change based on projections of current offenders among Three Strikes states. Macallair and Males (1999) compare counties with strict versus lax Three Strikes enforcement. They find counties that strictly enforced the sentence enhancements saw negligible effects on crime rates. Marvell and Moody's (2000) cross-state analysis also found Three Strikes has little effect on overall crime rates but found a significant increase in the number of murders. Comparing counties and age groups, Jaimeson (1999) finds little effect of Three Strikes on criminal participation. Shepherd (2001) compared the rates of triggering and non-triggering offenses before and after Three-Strikes and found significant declines in triggering offenses supporting a deterrence effect from expected increased punishment. Most recently, evidence from Helland and Tabarrok (2007) shows a significant deterrence effect of

Three Strikes law on second strike offenders concentrated among violent offenders.

Previous attempts to estimate the effect of Three-Strikes have been limited by the ability to establish a valid control group. This paper uses the unique structure of Three-Strikes law in which offenders with the same criminal history but different ordering of crime commission face different sentencing eligibility to identify the effect of Three-Strikes sentencing eligibility on criminal activity. In particular, the law required that an individual commit a "record aggravating" or "triggering" offense in order to activate eligibility for Three-Strikes law sentencing. This meant that individuals who committed a "triggering" offense followed by a felony faced different potential sentences than those who committed a felony and then a "triggering" offense. Using individuals who committed the same crimes but in different orders, I estimate a baseline difference in the likelihood of re-offending and of committing a violent crime conditional on re-offending prior to the law change. I estimate the post-Three-Strikes difference in their likelihood of re-offending and of committing a violent crime conditional on re-offending. Differencing out the baseline likelihood, I estimate a 9 percentage point decrease in the propensity to re-offend. In part, this appears due to a lengthened duration of non-participation in criminal activities by repeat offenders.

While Three Strikes had the intended effect of reducing participation in crime, there appear to be two sizeable unintended consequences of this law. First, there is an 8 percentage point increase in the propensity to commit violent crime conditional on committing a new crime. This effect, while smaller than the effect on the participation margin is a non-negligible and socially costly consequence of broad sentencing policies which apply equal penalties to a crime of varying severity. Second, some of the reduction in criminal participation in California appears due to the migratory response of repeat offenders who opt to move to lower-sanctioning states. Thus there appears to be a "beggar thy neighbor" spillover effect from state level sentencing laws.

This paper adds to the literature attempting to estimate the effectiveness of harsh sentencing regimes on crime levels. Consistent with more recent literature, I find an overall effect of a decline in the criminal participation rate among second and third strike eligible offenders and a reduced propensity to commit record-aggravating offenses among first-strike eligible offenders. In addition, this paper attempt to systematically disentangle the competing effects of broad sentence enhancements on both the decision to participate in criminal activity and the selection of type of crime committed conditional on participation criminal activity as well as the mechanisms by which reduction in criminal activity is accomplished (e.g. deterrence versus migration). Separating and

identifying the margins along which criminals adapt to sentence enhancements can reveal not only the overall effect of long sentences but also the general responsiveness of criminals to cost-based incentives and the relative magnitudes of their responsiveness across different margins of adjustment.

This rest of this paper proceeds as follows: Section 2 presents a framework for considering sentencing regimes and the specific case of the effects of Three Strikes law on criminal activity. Section 3 presents the data and strategy used to identify the causal effect of change in the penalty structure on criminal activity. Section 4 presents the results from an empirical analysis of the effect of Three Strikes law on the propensity to commit crimes as well as its effects on migration and crime selection. Section 5 uses the empirical results to estimate the social benefit of changes in sentencing structure and then offers some concluding remarks.

2. Theoretical Framework for Comparing Sentencing Regimes

Broad sentence enhancements have been a common tool for increasing the potential costs of criminal activity. Most policies focus on maximizing the effect of these laws on participation in criminal activity but there are several margins of along which criminals may adjust their behavior in response to the enhanced sentencing. For example, as illustrated in Stigler (1978) while the most obvious margin of adjustment is participation, another means of adjustment is the severity of crime (which assuming returns to crime are increasing in severity may raise the profit of crime despite the increased cost of enhanced sentencing). In this section I develop a simple framework for considering the potential effect of different types of sentence enhancements and then consider the specific case of California's Three Strikes law.

2.1 Basic Framework

To begin understanding the effect of changes in sentencing policies on a criminal's decision, consider a simple version of the rational criminal's decision-making process (based on Becker, 1968). An individual will choose to commit a crime only if the utility from this crime, as defined by the difference between the revenue and the expected cost of committing this crime (U_{crime}), is greater than some reservation utility ($\overline{U}$):

$$U_{crime} \geq \overline{U} \quad (1)$$

In such a model, the high cost of crime, typically generated by expected cost of imprisonment, will cause many individuals not to commit crime at all. To illustrate this relationship more formally, define the utility from crime:

$$U_T = p \cdot R^T - (1-p) \cdot g(P^T) - \theta \cdot T \qquad (2)$$

An individual's utility from crime expressed above is separated into three terms. The first term is the returns from crime of type *T*, R^T, which occurs with probability *p*. The second term is the utility of a failed attempted at crime type *T*, for which the criminal must pay P^T and receives utility corresponding to $g(P^T)$. This second term occurs with probability $1 - p$. The third term is the fixed cost to the criminal of committing crime *T*, $\theta \cdot T$, and occurs regardless of success. In this framework, θ^T represents an individual cost specific term that incorporates psychic costs of crime as well as other individual-specific factors which may generate utility or disutility from crime (i.e. the additional private return from crime). The distribution θ is described by $F(\theta)$ which admits a density $f(\theta)$. Normalize the utility of the outside option to zero. For illustrative purposes, let utility gain from crime be linear in the type of crime and let the utility from punishment be represented by the function *g* which is strictly monotonic in P^T and twice differentiable. [1]

For simplicity, suppose there are only 2 types of crime. Violent crime has a payoff $R^H = H$ and a penalty of P^H and non-violent crime has a payoff of $R^L = L$ and a penalty of P^L where $H > L$ and $P^H \geq P^L$. Using these simplifications, it is possible to divide the decisions of individuals in the distribution into three categories: non-criminal activity, non-violent crime, and violent crime. The criminal participation margin is defined as the value of θ which sets the utility from non-criminal activity ($T = 0$) and non-violent criminal activity ($T=L$) equal.[2] Defining $\theta^{Participate}$ as the value that makes the participation constraint hold at equality, the probability that an individual will participate in crime is:

$$\Pr(\theta \leq \theta^{Participate}) = F\left(\tfrac{1}{L}(pL - (1-p)g(P^L))\right) \qquad (3)$$

The cutoff value from equation 3 is illustrated in figure 1, where *F* is assumed to be a normal distribution with mean 0 and variance 1. As illustrated, the distribution of θ generates a range of

[1] Note that if g(.) were simply linear then the results in this section would obtain. However, because we wish to allow for an ambiguous effect of an intercept shift in the level of punishment (rather than the ratio of the punishments), the added complexity of a more general g(.) function is included.

[2] Note that the subsequent analysis assumes, $\theta^{Participate} < \theta^{Severity}$. This will be the case if $g(P^H)$ is sufficiently small relative to $g(P^L)$. Specifically, this condition will hold if $\frac{H-L}{L} \geq \frac{g(P^H)}{g(P^L)}$.

individuals who participate in crime some of whom would shift their behavior into non-criminal activity with a small increase in costs and some of whom would not deterred even after a large increases in the cost of crime. Since g (.) is monotonic in P_L, an increase in the penalty for non-violent crime will shift $\theta^{Participate}$ to the left. Thus, some individuals are deterred from engaging in criminal activity.

The crime severity margin is the boundary value of θ at which criminals decide to participate in non-violent or violent crime. Individuals who commit violent crime are intuitively the set of individuals whose value of θ sets the payoffs from non-violent ($T = L$) as less than those from violent ($T = H$). Defining $\theta^{severity}$ as the value of θ which sets the payoffs from the two types of crime equal, the probability that an individual will participate in violent crime is:

$$\Pr(\theta \le \theta^{Severity}) = F\left(\frac{1}{H-L}(p(H-L)-(1-p)(g(P^H)-g(P^L))\right) \quad (4)$$

Thus for individuals with a sufficiently low θ, participation in violent crime will be optimal. However, equation 4 illustrates that that this decision may be affected by either the penalty for violent crime (P_H), the penalty for non-violent crime (P^L), and the relationship between the two penalties.[3]

2.2 Changing the Penalty-Severity Gradient

In the basic framework, the existence of the criminal participation margin and crime severity margin is generated by an assumed difference in the penalty structure which penalizes more serious crimes (e.g. violent crimes) more severely.[4] Suppose the relationship between the penalty for violent and non-violent crime is described as follows: $P_L = \beta \cdot P_H$ where $0 < \beta \le 1$. In this setting, $1/\beta$ represents the penalty-severity gradient. A small β corresponds to a steep gradient meaning a very large penalty for violent crime relative to non-violent crime. If $\beta=1$ then the crime-severity gradient is flat meaning that there is no additional penalty for more severe crimes. Using this

[3] This follows in the vein of Stigler (1970) and Becker (1968). The debate between the two articles concerns what role that a penalty gradient with respect to crime severity might play. In his classical model, the efficient criminal punishment system applies maximal (ideally infinite) punishment to all crimes with low probability of enforcement. This system is efficient in the sense that it has the highest ratio of crimes deterred relative to cost. Stigler countered that this effect was concentrated on the participation margin, which he labeled "average deterrence." In Becker's model, the additional penalties for more severe crime, which Stigler labeled "marginal deterrence" introduced inefficiency in the sense that it potentially lowers this ratio. Stigler's response suggested that the increased marginal cost of crimes was necessary to transfer the increased social cost of these crimes onto the individual imposing the costs on society.

representation of the penalty structure, the cutoff values of θ from equations 3 and 4 can be rewritten as functions of β and P_H.

$$\Pr(\theta \le \theta^{Participate}) = F\left(\tfrac{1}{L}(pL-(1-p)g(\beta P^H))\right) \quad (5)$$

$$\Pr(\theta \le \theta^{Severity}) = F\left(\frac{1}{H-L}(p(H-L)-(1-p)(g(P^H)-g(\beta P^H))\right) \quad (6)$$

Taking the derivative of the *F(.)* in equation (5) with respect to β yields the expression: $-\frac{1}{L} f(.)(1-p)\frac{\partial g(\beta P^H)}{\partial \beta}$. Thus an increase in β or a flattening of the penalty gradient will decrease the number of individuals willing to participate. Intuitively, this is because the crime participation margin is created by the cost of non-violent crime. As illustrated in figure 1, an increase in this cost will shift $\theta^{participate}$ to the left, decreasing the number of people willing to engage in criminal activity.

Taking the derivative of *F(.)* in equation (6) with respect to β yields the expression $\frac{1}{H-L} f(.)(1-p)\frac{\partial g(\beta P^H)}{\partial \beta}$. This suggests that an increase in β or a flattening of the penalty gradient will increase the number of people willing to participate in violent crime. This occurs because the returns from successful criminal activity are fixed and thus an increase in the cost of non-violent crime relative to non-violent crime changes the relative profitability of violent crime relative to non-violent crime. This can be illustrated in figure 1 as a shift to the right of $\theta^{severity}$, which encompasses a larger fraction of the total distribution as well as a larger fraction of individuals committing crime.

To summarize, an increase in the penalty of non-violent crime relative to violent crime has two effects: first, it reduces the number of individuals willing to participate in criminal activity. Second, it increases the fraction of individuals participating in criminal activity who engage in violent crime.[5]

2.3 Changing the Penalty Level

While a change in the penalty-severity gradient has clear predictions for the change in the crime participation and severity margins, a simple scaled increase in penalties has a more ambiguous

[4] This was generated in the above case by assuming $P^H > P^L$.

[5] In the language of Becker and Stiglitz, for non-violent crime the average and marginal deterrence effect move in the same direction and the model predicts an unambiguous decline in non-violent crime. For violent crime, the average

effect. Suppose rather than changing the penalty gradient, there is an increase in the absolute level of penalties of crime such that the new penalty, $\overline{P}_T$ is defined as $\overline{P}_T = \frac{1}{\alpha} P_T$ for *T = H, L*. *1/α* represents the inflation factor of the new sentencing regime relative to the old and as such $0 < \alpha < 1$.

In this case the penalty for violent relative to non-violent is the same before and after the change in penalty structure, that is $\frac{P_L}{P_H} = \frac{\overline{P}_L}{\overline{P}_H}$.

Again substituting this into equations 3 and 4 yields the following expression:

$$\Pr(\theta \le \theta^{Participate}) = F\left(\tfrac{1}{L}(pL - (1-p)g(\alpha \overline{P}^L))\right) \tag{5}$$

$$\Pr(\theta \le \theta^{Severity}) = F\left(\frac{1}{H-L}(p(H-L) - (1-p)(g(\alpha \overline{P}^H) - g(\alpha \overline{P}^L))\right) \tag{6}$$

Differentiating equation (5) with respect to α yields the following expression:

$-\frac{1}{L} f(.)(1-p)\frac{\partial g(\alpha \overline{P}^L)}{\partial \alpha}$. By the same logic as the flattened penalty gradient, the increased penalty for non-violent crime (i.e. a smaller *α*) corresponds to a reduction in the number of individuals willing to engage in criminal activity.

The crime severity margin is more ambiguous. The derivative of equation (6) with respect to *α* is:

$$\frac{\partial F(\theta^{Severity})}{\partial \alpha} = -f(\theta^{Severity}) \cdot \frac{(1-p)}{\Delta}\left[g'(\alpha \overline{P}_H)\overline{P}_H - g'(\alpha \overline{P}_L)\overline{P}_L\right] \tag{7}$$

And thus the sign of this depends on the term $g'(\alpha \overline{P}_H)\overline{P}_H - g'(\alpha \overline{P}_L)\overline{P}_L$. The inflated sentencing will have the same effect as the flattened sentencing if $g'(\alpha \overline{P}_H)\overline{P}_H - g'(\alpha \overline{P}_L)\overline{P}_L < 0$ or if $\frac{g'(\alpha \overline{P}_H)}{g'(\alpha \overline{P}_L)} < \frac{P_L}{P_H}$.

Intuitively, this requires that the utility from an unsuccessful crime attempt (i.e. *g(.)*) be sufficiently concave that the enhanced cost from violent crime has a low cost in utility terms relative to the enhanced cost from non-violent crime. If *g(.)* is convex, we might expect that individuals will shift from violent to non-violent crime because of the escalating disutility from more severe crime. That is the concavity or convexity of the *g(.)* function serves the *de facto* role of flattening or steepening the penalty gradient for sufficiently high penalties.

To summarize a level increase in the penalties of both violent and non-violent crime has two

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and marginal effects move in different directions and the overall effect of the policy is ambiguous.

effects: first, it reduces the number of individuals willing to participate in criminal activity. Second, it has an ambiguous effect on the fraction of individuals participating in criminal activity who engage in violent crime.

2.4 California's Three-Strikes Law as an Instrument for Changes in Sentencing Structure

In 1993, Washington and Wisconsin were the first states to adopt Three-Strikes sentencing laws. By 1997, twenty-two other states and the Federal Government instituted similar statutes. The common underlying theme among these statutes was severe punishment for recidivist offenders. Although many states ignored their statute, two important components of California's law led it be strictly enforced. First, the broad coverage of the law offered highly enhanced sentencing for all felonies allowing wide application. Second, lack of judicial discretion prevented judges from circumventing the law in cases in which its application seemed unreasonable.[6] In California as of 2000, over 40,000 offenders have been sentenced under Three-Strikes while no other state has even reached 1000 (Zimring, Hawkins, Kamin, 2001).[7]

Three-Strikes changed the entire sentencing structure for felonies in two distinct ways. In order to activate Three Strikes sentencing, individuals needed to be convicted of a "record aggravating" offense. As Table 1 shows, the aggravating offenses are very broad under California law, ranging from murder and rape to burglary.[8] The important aspect of the legal structure was that California law invokes a second or third strike for *any felony*, so long as the individual was previously convicted of an aggravating offense.[9]

Specifically the structure of the law introduced two distinct changes to the penalty structure. On the third strike, California's Three Strikes law required individuals to serve the maximum of three times the sentence of the current felony or 25 years to life. Eligible individuals did not face any additional punishment for violent offenses relative to non-violent ones. This corresponds to a flat penalty-severity gradient (i.e. β =1) and the anticipated effect illustrated above is a decrease in criminal participation but an increase violent crime conditional upon participation. On the second

[6] In California, only prosecutors had discretion as to whether to charge individuals with qualifying offenses until 1997, when the California Supreme Court reinstated judicial discretion.

[7] Several studies (National Institute of Justice, 1996; Dickey, 1996; Kessler and Levitt, 1998), as well as anecdotal observations by the media indicate that Three-Strikes statutes have rarely been invoked anywhere else.

[8] Definitions of offenses are presented in Appendix Table 1.

[9] In fact, a prior prison sentence is not even required to trigger additional penalties, a unique feature of California law (Clark, Austin, and Henry, 1997).

strike, California's Three Strikes law criminals faced a doubling of the sentence for the second felony. Thus, on the second strike, eligible individuals faced inflated sentences for all crimes. This corresponds to the case where α =0.5 such that $\overline{P}_T = 2P_T$ for both violent and non-violent crimes. There is an ambiguous effect on the severity of crime conditional on participation that depends on the nature of the disutility from unsuccessful criminal attempts.

To summarize the predicted overall effect of the law: (1) there is an unambiguous decline in participation in criminal activity among second and third-strike eligible offenders, (2) there is a shift to more severe crime among third-strike eligible individuals who participate in crime, and (3) there is a potential change in the severity level of crime committed by second strike.

3. DATA AND IDENTIFICATION

The analysis in this paper uses a sample of offender records for individuals arrested from 1990-1999 sampled from three California cities: Los Angeles, San Francisco, and San Diego. The sample thus includes individuals who have been arrested at least one time for a felony, though many of these individuals will not have been convicted. This data is linked to the Criminal Offenders Record Information (CORI) which provides information on previous and future offenses. The retrospective information includes prior convictions, prior sentences served, and the total number of prior arrests. The information on future criminal activity details all felony convictions after the year of arrest until 1999. These arrest records also document the final disposition of the crime for which the individual is under arrest which includes conviction and sentence length. Finally, the arrest records include some information on personal characteristics such as age, gender, and race. I partition individuals into three groups: first strike eligible, second strike eligible and third strike eligible based on their criminal history and current offense and disposition. Within each group, offenders have between zero and six prior felonies. In addition, I append information on police spending, prosecution, and other criminal justice spending from California Criminal Justice Profiles. I also use information on unemployment and poverty information from the Current Population Survey.

It is worth noting that the data used in this paper, while imperfect, represents a substantial improvement on previous data used to study the effect of sentencing enhancements on criminal activity. Much of the previous work uses aggregate crime rates relying on regional and/or

temporal variation to identify the effects of sentence enhancements. An exception to this is recent work by Helland and Tabborak (HT). HT identify the effect of Three Strikes using whether an individual is convicted of two versus one strikeable offense as an exogenous source of variation. There are several reasons why this identification may not be the best way to identify the effects of the law change.

First, to the extent that there are systematic differences in offenders with two convictions versus one, estimates which only difference post-law change will tend to be biased. While HT tests this assumption in states without Three-Strikes law and find little difference, if the willingness or ability of juries to convict individuals of strikeable offenses changes as a function of the law, then HT's tests will not be able to ascertain the validity of their identifying assumption. Indeed, there appears to be a relationship between Three Strikes law on the rate of negotiated sentences (plea bargains). The fraction of cases decided by jury trial increased almost 10 percent after the enactment of Three Strikes.[10] While I cannot causally relate this to Three Strikes, discussions with district attorneys, defense attorneys and judges suggests that Three Strikes law has been one of the primary causes for this increase in the rate of cases going to trial. Because they are likely to face a lengthy sentence regardless of a plea bargain, many defendants decide not to negotiate a plea bargain in second and third strike cases. Thus many more offenders choose to go to court in the hopes of avoiding a conviction altogether altering the probability of conviction after the law change. Moreover, even if Three Strikes did not cause the increase in trial rates, the concurrent change in sentencing law and trial rates makes it difficult to separately identify the Three Strikes effect from other changes.

Second, because of the nature of discretion in the criminal justice system, the further along the process data is collected the more affected by discretion is the data. Ideally, we would observe all of the criminals who commit crime regardless of detection. Arrest is only one-step removed from that as it requires only detection by police. Cases brought to trial are several steps removed, requiring the decision to prosecute, determination of sufficient evidence for trial by a grand jury, and decision to go to trial. Such discretion can be directly influence by the law change. For instance, in some areas prosecutors sought Three Strikes enhancements only in

[10] This is based on the estimates of the change in the probability of a jury trial conditional on being prosecuted for a strikeable offense based on California Department of Justice statistics. From the data used in this paper it is not possible to observe whether criminals were convicted due to a plea bargain or by trial. However, the probability of conviction does change significantly after the law and this change varies by city.

certain cases, such as for certain types of crimes that are particular problems in their county or where the current offense is serious or violent. While in other counties, prosecutors seek Three Strikes enhancements in most eligible cases. Similarly, after 1997, judges varied in how often they dismiss prior strikes, based on discretion afforded to them under the *Romero* decision.[11]

Third, there was a great deal of variation in the rate at which offenders who were arrested faced penalties from Three-Strikes law. A legislative analysis by Brown and Jolivette (2005) noted considerable variation among counties in the likelihood that an offender who is arrested would be prosecuted and convicted under the Three Strikes law. For example, Kern County was over 13 times more likely to send an arrestee to state prison with a strike enhancement than San Francisco County. This variation makes it difficult to identify the effect of Three Strikes penalties on offenders independent of prosecutorial conduct.

The approach used in this analysis is to compare similar individuals who faced different strike eligibility before and after Three Strikes law was introduced. If we could observe the true underlying propensity of individuals to commit a crime in the pre-Three-Strikes era, and then their propensity to commit a crime in the post-Three-Strikes era, we could attribute the difference in the propensity to commit crime to the effect of harsher sentencing (either through incapacitation or deterrence). In practice it is not possible to observe an individuals true probability of committing crime. However, we can observe among individuals who had previously committed a crime, whether their probability of committing another crime changes after the law change. Specifically, suppose that we believed the underlying distribution regarding the probability of recidivism was fixed over time except with respect to Three Strikes sentencing. Then if we observed in a change in the propensity to commit a crime among individuals who had previously committed crimes—that is a change in the propensity to commit a crime—then we can attribute that to the average deterrence effect from Three Strikes.

In order to match plausibly similar individuals, I use an individual's prior criminal history (*PCH*) as the source of identification.[12] Under Three strikes, individuals with the same criminal

[11] On June 20, 1996, the state Supreme Court ruled in *People v. Superior Court* (Romero)that the court has the discretion to dismiss prior serious or violent felony convictions under the Three Strikes law. For a discussion of the evolution of Three Strikes law see Brown and Jolivette (2005)

[12] The prior criminal history (PCH) variable is a vector of indicator variables for the types of crimes committed prior to the current offense, where prior crime categories are murder, rape, assault, robbery, burglary, theft, drugs, and other miscellaneous felonies.. For example, an individual with two priors in burglary and theft would have non-zero values for burglary and theft and zero values for all other crime types.

history, but different ordering of crimes have different sentencing eligibility. This mismatch between strikes and felonies arises because while all felony convictions count as strikes after the first strike, only certain felonies are covered as record aggravating or "triggering" offenses (to give an individual a record-enhancing strike and evoke the harsher penalties). The list of record aggravating offenses is presented in Table 2. Using this fact, I assume that individuals with the same *PCH* variable have a fixed difference across time in all respects except sentencing eligibility. Comparing individuals with similar histories but different Three Strikes eligibility before and after Three-Strikes provides a means to measure the change in propensity to commit crime as well as the change in propensity to commit a violent crime associated with the law change.

To illustrate the identification strategy, consider the following example with two criminals both of whom have previously committed a theft and a burglary. Criminal A first committed a theft and then committed burglary. Criminal B first committed a burglary and then committed a theft. Under sentencing guideline prior to Three-Strikes, both these individuals would face similar sentencing eligibility if they committed a third offense. However, after the Three-Strikes law change, the ordering of the crimes committed matters. Because burglary is a triggering offense, it activates Three-Strikes sentencing. All felonies committed after the activation of Three-Strikes then count as strikes. Thus, if individual A commits a new offense, that offense will count as a second strike since he has committed no offenses after the burglary. In contrast, a new offense committed by individual B will count as a third strike because he committed a theft after committing a burglary. Thus in the post-period, individuals A and B are exposed to different penalties based on the ordering of their previously committed crimes.

Because there may be differences in the probability of committing a crime and the type of crime committed by an individual who first commits a less serious crime and then more serious crime relative to an individual who commits a more serious and then a less serious crime, it is important to control for the baseline difference in propensity to commit crimes. Thus I compare a pair of individuals A and B, before and after the law change. I assume that a pair of individuals with the same criminal history but different orderings of those crimes have a fixed difference in their probability of committing a new offense. I will attribute the change in the difference between these two individual's propensity to commit a crime to Three Strikes sentencing eligibility.

There are two important exclusions in these data that may result in a mis-measured *PCH*

measure. First, juvenile records were not included despite the fact that under Three-Strikes juvenile offenses may count as a strike if they meet the statutory criteria. Second, out-of-state felonies count as a strike but are not documented in California arrest records. Thus, while I might observe individuals who exit the California criminal market, I cannot observe whether individuals committing offenses in California are first time offenders or migrants from other states. Barring these exclusions, this data provides a comprehensive set of information regarding individuals allowing relatively detailed comparison of offenders.

In order to construct the *PCH* variable, I classify previous convictions into one of seven categories: murder, rape, assault, robbery, burglary, theft (which includes larceny and motor vehicle theft), drug crimes, and other crimes. The definitions of these categories are presented in Table 3. I then construct the *PCH* variable. *PCH* is a vector-valued variable which counts the number of prior convictions in any of the seven offense categories. Returning to the example above, both criminal's A and B would have the same prior criminal histories

PCH = [0 0 0 0 1 1 0 0].

In general, it would be troublesome to use prior criminal history as a control variable for an individual's innate propensity to commit crime, as the prior history itself may be affected by the law change. That is, individuals may be deciding whether to commit crimes now based, in part, on their effect on sentencing for future crimes. In order to avoid including this, I restrict the sample to individuals who committed their prior offenses before the law change (in 1994). Thus the retroactive nature of Three Strikes makes the variation in *PCH* independent of enhanced sentence eligibility in both the pre- and post-Three Strikes periods.

In addition, because of the censoring that occurs for individuals who commit crimes prior to 1990, I restrict the analysis to offenders who committed at least one prior criminal activity between 1990 and 1994. This eliminates the problem of observing individuals who commit crime pre-1990 and then never commit crime again.

The above restrictions may generate the concern that individuals who commit crime in the pre-period may be less crime prone than those in the post-period because the sample is in part selected on the timeframe of an individuals criminal history. To address this all specifications include the felony rate per criminal year (FRCY). The FRCY provides a measure of the combination of effect from youth and being a "crime-prone" individual. Specifically, it is defined as:

$$FRCY = \frac{Number\ of\ \ Felonies\ Commited}{Age\ of\ \ Offender - Time\ in\ \mathrm{Pr}ison - 18} \qquad (6)$$

I also include offender age as a control variable, which allows both an age effect as well as a rate effect, conditional on age. [13]

The final sample restriction I impose is that I remove all offenders who are serving prison sentences for the entire analysis period since by construction they cannot recidivate. Because the time frame for recidivism used in the subsequent analysis is relatively short, this should not systematically bias the propensity for recidivism before and after the law change.

Summary statistics for the sample used in the analysis are reported in Table 2. When compared to the statewide criminal population (not reported), the sample differs from the general population on key demographics. The sample includes a high fraction of minorities especially blacks than in the population on average. The higher proportion of minorities is due to the sampling of cities and the higher proportion of blacks is due to the concentration of blacks in Los Angeles. Comparing outcomes between the cities also yields some notable differences. The fraction of individuals charged with record aggravating offenses appears significantly higher in Los Angeles than in San Francisco and marginally higher than in San Diego. This is consistent with previous literature which suggests Los Angeles was more zealous in its enforcement of Three Strikes. Similarly, conviction rates of second-strike and third-strike eligible defendants were significantly higher in both Los Angeles and San Diego, than in San Francisco. This difference declines after 1997 most likely due to the introduction of judicial discretion.

4. RESULTS

Before looking at the estimated effect of Three Strikes on criminal activity, I verify that Three-Strikes resulted in sentencing differences by strike eligibility. Table 3 reports the sentencing statistics before and after Three-Strikes for offenders convicted after arrest.[14] It appears that Three-Strikes did in

[13] This restriction may raise the concern that individuals in the pre-period were required to commit their current offenses in more rapid succession than those in the post-period. If these are "worse" criminals in the sense that they are more likely to recidivate than the reported estimates would tend to overstate the recidivism effects of Three Strikes Law. Thus in addition to the FRCY inclusion, I test the sensitivity of the reported results to these sampling restrictions in two ways. First, I include all individuals regardless of the year in which their prior was committed. Second, I restrict the post sample to 1995-1996. This creates a symmetric timing requirement for pre- and post-law change samples. Results are consistent across regression and are reported in Appendix Table 3.

[14] Although in general, there are not significant differences between individuals with updated information versus those without, there does appear to be a marginally significant difference between individuals with current offenses

fact double sentences on the second strike and dramatically increased sentences on the third strike, as is required by law. It is worth noting that there is no effect on sentence length for first-strike eligible offenders but these offenders do face different penalty profiles for future offenses (as noted in Shepherd 2001). Moreover, while there is variation in the probability of conviction by cities, conditional on conviction there is no significant difference in the sentences faced by criminals.

4.1 Estimating the Participation Effect

I define the participation effect of Three Strikes as a change in the probability of committing a crime conditional on strike eligibility. To motivate this interpretation of the participation effect, consider a latent variable model where we define a variable Y^* such that $Y^* = U_{Crime} - U$. Then, assume that Y^*, the difference in utility from criminal and non-criminal activity, is a function of strike eligibility, prior criminal history, and individual characteristics. Therefore, we can write Y^* as:

$$Y^*_{ict} = \beta_0 + \beta_1(2strikes_{ict}) + \beta_2(3strikes_{ict}) + \beta_3(after * 2strikes)_{ict} + \beta_4(after * 3strikes)_{ict} + \beta_5(PCH_{ict}) + \beta_6(individual\ controls_i) + \gamma_t + \delta_c + \varepsilon_{ict} \quad (7)$$

In equation (7), *2strikes* is an indicator variable for second strike eligibility, *3strikes* is an indicator variable for third strike eligibility, *PCH* is a vector valued variable detailing an individual's prior criminal history, and individual controls include age race, sex, and felony rate per criminal year. Although the latent variable, Y^* is not observable, I can observe whether an individual chooses to commit a crime (call this variable *Y*). The observed binary variable *Y* is 1 if $Y^* > 0$ and 0 otherwise. I can then estimate a linear model of the probability that an individual chooses to commit a new crime before and after the law passage and use the difference as a measure of the laws effect on criminal participation.

Because the data is drawn using individuals who are currently under arrest, in order to estimate how Three Strikes affected the probability of recidivism I examine how their strike eligibility affects the probability that they commit a crime at some point in the future. For future crimes, an individual's true strike eligibility includes both the total number of previous convictions and the current offense if convicted. However, using the true strike eligibility as a measure of the cost of a future crime is problematic for two main reasons. First, individuals

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of assault or drugs who have updated sentencing information.

arrested for a felony after the law change may have chosen the type of crime for which they are currently under arrest in response to the law change. The theoretical prediction that penalty structure may affect the severity of the crime chosen after the law change makes including the current offense as part of strike eligibility undesirable. Second, because conviction after Three Strikes appears to be affected by the law change, a measure of strike eligibility after the law change includes the endogenously changing conviction rates.

Thus in order to predict the effect of strike eligibility on the probability of recidivating, I use an individual's strike eligibility based on his/her prior criminal history committed before the law change as an instrument for an individual's true strike eligibility. In order to do this, I construct an individual's true strike eligibility as determined by their strike eligibility from their prior criminal history plus an additional strike if they were convicted of a strikeable offense (either a felony if Three Strikes was already triggered or a triggering offense). I then construct four indicators: second strike eligible (*strikes2*), third strike eligible (*strikes3*), second strike eligible after 1994 (*after*strikes2*) and third strike eligible after 1994 (*after*strikes3*). I also construct a *PCH* based strike eligibility by counting the number of strikes acquired in the period pre-1994. Then I define the *PCH* based indicators: *strikes2_pch*, *strikes3_pch*, *after*strikes2_pch, after*strikes3_pch* which count the number of strikes based on the individuals prior criminal activity excluding the crime for which they are currently under arrest. Using these *PCH* based strike counts, I estimate a first stage of this regression and instrument for *strikes2*, *strikes3*, *after*strikes2*, *after*strikes3* in equation 7. The t-statistics for all first stages are significant at the 1 percent level.

The data used spans 1990-1999 and thus individuals toward the end for the time series will be censored. To limit the fraction of the sample that is censored, I estimate the probability that an individual recidivates within 2-years of his/her release.[15] The results of this analysis are presented in table 4. Columns (1) and (2) compare the OLS and the instrumental variables (IV) regressions. The OLS appears to be upward biased consistent with a change in the composition of offenders convicted after Three Strikes changes. If the offenders convicted after the Three Strikes law change were less likely to recidivate then the post-Three Strikes cohorts would include some individuals with a lower propensity to recidivate. Thus, some of the reduced

[15] The choice of 2 years was based on criminology literature which suggests that most offenders who recidivate will do so within 2 years of their release from prison. The results presented are not very sensitive to the length of this

recidivism from the compositional change in Three-Strikes conviction rates is attributed to the behavioral response of criminals. The instrumental variable estimate implies a 9 percentage point (18 percent) reduction in the probability of recidivating among second strike eligible offenders. The effect for third strike eligible offenders is higher, corresponding to a 14 percentage points or 28 percent reduction. Column (3) includes additional controls for economic factors and criminal justice expenditures. The estimates appear robust to the inclusion of these additional variables.

To test how the stringency of enforcement affects the deterrent effect, columns (4) through (8) report the OLS and IV estimates by city. Because a proportionally high fraction of the total number of offenders come from Los Angeles, the results from Los Angeles appear consistent with those in the Three City sample. There does appear a slightly larger difference between the IV and OLS estimates in Los Angeles relative to either San Diego or San Francisco. In San Diego, the IV is smaller than the OLS estimate, consistent with the pooled results. In San Francisco, however, the OLS estimates are smaller than the IV estimates. If they are different, this would suggest that discretionary use of Three Strikes is resulting in worse criminal being sentenced under Three Strikes' harsher sentencing. However, because of the large standard errors I cannot reject that the IV and the OLS are the same size.

4.2 Estimating the Migration Effect

While the lower probability of recidivating may be due to reduced participation, another less-desirable way in which crime in California might decline is the migration of repeat offenders into other states in order to commit crimes. Indeed the probability that a criminal will commit crime outside of California increased significantly after the Three Strikes law was introduced. However, because migration might be increasing generally during this time period, I estimate two specifications attempting to identify the impact of Three Strikes law on inter-state migration of criminals.

First, I estimate the propensity for criminals to commit crime in California, as a function of strike eligibility, before and after Three-Strikes law. Specifically, I estimate:

$$\begin{aligned}\Pr(\textit{Crime in CA}) = {} & \beta_0 + \beta_1(2\textit{strikes}_{ict}) + \beta_2(3\textit{strikes}_{ict}) + \beta_3(\textit{after} * 2\textit{strikes})_{ict} \\ & + \beta_4(\textit{after} * 3\textit{strikes})_{ict} + \beta_5(PCH_{ict}) + \beta_6(\textit{individual controls}_i) + \gamma_t + \delta_c\end{aligned} \quad (8)$$

window. Sensitivity checks using 1-year and 3-years are presented in Appendix Table 2.

Again to account for the endogeneity of conviction rates in the post-Three Strikes time period, I instrument for strike eligibility using the criminal history. The results are presented in columns (1) through (3) of table 5. The results show a larger participation effect of individuals committing crime within California. Thus there appears to be a participation effect separate from the migration effect and the migration effect moves in the opposite direction as the within-state participation effect.

I next estimate the relationship between strike eligibility and the probability of committing crime outside of California conditional on recidivating as specified in equation (8). Consistent with the notion that criminals facing second and especially third strike eligibility migrate to other states, I find a 6 percentage point increase in migration among second strike offenders and an 8.5 percentage point change among third strike offenders. Thus it appears that among offenders committing new crimes, a growing fraction commit those crimes in other states. The overall migration effect is smaller in magnitude than within state participation but large relative to the fraction of individuals who migrated to conduct criminal activity prior to the law change.

In the sample, the two most frequent states to which criminals migrate are Nevada and Arizona. Nevada's equivalent of Three-Strikes law applies only for violent offenses and appears to be rarely invoked.[16] Arizona does not have habitual offender legislation. It is worth noting that these results are likely a lower bound on the estimated probability of migrating. An individual shows up in the data as having committed a crime in another state if that state requests criminal records. Because many states may not request criminal records for low-level felonies, some individuals who migrate out and commit crimes will not appear in this data.

4.3 Estimating the Crime Severity Effect

While Three-Strikes appears to have had the anticipated effect of reducing recidivism among strike-eligible offenders, it may also have an effect on the distribution of crimes committed by recidivating criminals conditional on strike eligibility. Following the procedure used to estimate the participation effect, define $V^* = U(violent) - U(non-violent)$. Next,

[16] Numerous articles and anecdotal evidence suggest that except in California, Three Strikes statutes are rarely invoked. See for example New York Times (1996)

suppose that V^* is a function of an individual's strike eligibility, age-crime rate, prior criminal history, county characteristics, and individual characteristics, such as age, race/ethnicity, and sex. Then the

$$V_{ict}^* = \beta_0 + \beta_1(2strikes_{ict}) + \beta_2(3strikes_{ict}) + \beta_3(after * 2strikes)_{ict} + \beta_4(after * 3strikes)_{ict} + \beta_5(PCH_{ict}) + \beta_6(individual\ controls_i) + \gamma_t + \delta_c + \varepsilon_{ict} \quad (9)$$

Again defining a binary variable *V* that is 1 if V^* is greater than zero and 0 otherwise, I estimate a linear probability model of the probability that an individual chooses violent crime before and after the law passage and use the difference as a measure of the laws effect on crime choice. Taking a set of observations on crime choices, I can estimate the change in the distribution of crime types, i.e. the marginal deterrence effect. Note that the identification in equation (9) comes solely from individuals with the same prior criminal history facing differing strike eligibility. Because the sampling requires that all individuals have current offenses, I can use all individuals with a pre-period determined *PCH* and estimate the change in the crime severity differential probability before and after the law change. Thus unlike in the general participation estimates it is not necessary to estimate an instrumental variables specification.

Table 6 reports the results of these regressions. Column (1) reports coefficients for a linear model with the outcome as whether an individual committed a violent crime or not. The estimate of propensity to commit violent crime indicates that second strike eligible individuals who choose to commit a felony after Three-Strikes was passed are about 4 percentage points more likely to choose a violent crime over a nonviolent crime than their counterparts were prior to Three-Strikes. Similarly, third-strike eligible individuals are about 10 percentage points more likely to commit violent crime. The similar effect on second strike eligible offenders suggests that the doubling of penalties does not simply create a higher marginal cost of severity across the board but rather appears to flatten the cost of more serious crime, possibly due to concavity in the cost function of criminals. Columns 2 through 8 in Table 6 provide estimates of the probability of committing a given type of crime (conditional on committing crime). Third strike eligible offenders are more likely to commit rape and robbery and less to commit burglary and theft. Among second strike eligible offenders the pattern was very similar but with no significant decline in theft rates. Because burglary is record aggravating offense despite being nonviolent, offenders who commit crime may be seeking a greater "bang for their buck" by committing higher payoff, and therefore more violent, crimes. There also appears to be fewer substitutions from

burglary but more substitutions from theft among third strike eligible offenders. [17]

Overall these results seem consistent with the theory that by eliminating marginal deterrence, Three-Strikes resulted in a crime distribution that is skewed towards more violent crimes. For example, the decrease in murder given Three-Strikes seems reasonable since premeditated murder activates the death penalty, thus preserving marginal deterrence. Therefore, conditional on committing a violent crime, criminals should substitute away from murder to assault or robbery. The shift away from non-violent crime towards assault or robbery also seems consistent with the theory the marginal deterrence is relevant. The most compelling evidence appears in the increase in robbery and the decrease in burglary. Robbery and burglary are similar crimes in terms of goal, but differ in the element of force. Moreover, both offenses are record aggravating, which means they generate similar sentence eligibility.

One alternative explanation for these results is that police officers began charging individuals with more serious crimes after the passage of Three-Strikes law. If this is correct, then the type of the crimes committed before and after Three-Strikes are the same and instead police discretion about the crime with which an offender is charged resulted in more serious charges for Three-Strikes eligible arrestees. While the use of discretion for an arrest is plausible, it is checked in part by the need for a judicial arrest warrant. Because the charges for violent felonies, like murder, rape and robbery, are difficult to compare to any nonviolent or misdemeanor crime it is difficult to imagine that judges would sanction the substitution of felony charges for lesser degree crimes. Discretion could apply in cases where individuals are arrested during the commission of a crime or during other exigent circumstances. However, in these cases it is unlikely that officers would know the strike eligibility of a particular individual.[18] Moreover, it is not necessarily clear that officers would have an incentive to charge more serious crimes. They might charge less serious crimes after Three Strikes to offenders who they perceive as less dangerous, which would bias against the results presented in this paper.

Another alternative explanation consistent with the results presented in this paper is that offenders for non-violent crime are disproportionately deterred from committing crime. Thus, rather than a substitution effect, the results simply indicate the relative composition effect.

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[17] These results appear to be linked to Three Strikes law change. I performed falsification checks to test the timing of the shift in severity by limiting the data to 1990-1993, pre-law change. I artificially assign 1992 as the placebo year of law change and find no significant changes when estimating the regression equation (9). Results are presented in Appendix Table 4.

[18] This theory would be of greater concern with indictment or conviction level data, where charges often reflect both the nature of the crime and a bargaining position for plea negotiations. Kesseler and Piehl (1998)

Consistent with this view, the unconditional probability of any offense declines, albeit less for violent than for non-violent crime. Specifically three-quarters of the decline in crime rates appear to be due to the reduction in criminal participation by non-violent offenders.[19] Such results are consistent with a story where violent criminals are less able to be deterred and thus enhanced sentencing reduces non-violent crime while keeping violent crime more-or-less constant. This would produce results similar to those reported in Tables 5 and 6. While there does not appear to be a systematic way to disentangle the substitution story from the composition story, I marshal some evidence that suggests that at least some of the effects are due to substitution. First, there also appears to be a change in the types of crimes committed by first-strike eligible offenders. The probability that a first-strike eligible offender committed a record aggravating offense declined significantly by 8 percentage points (12 percent).[20] Under Three Strikes the penalty associated with a triggering offense could be higher for individuals expecting to engage in criminal activity over their lifetime. For these criminals, substituting from record aggravating to non-record aggravating offenses is consistent with the crime severity substitution effect. Second, the change in nature of the violent crimes being committed in the post-period appears more consistent with a substitution story than a compositional story. The increase in the conditional likelihood to commit violent crime appears entirely driven by robbery and rape. Thus, the compositional story would require a deterrent effect largely from burglary that results in the post-Three Strikes distribution being higher only in these two crimes. Finally, an analysis of lesser-included charges, when looking at the fraction of rapes and assaults which occur during non-violent crimes in the post-period, there appears to be a significant increase in these rapes relative to other forms of rapes or assault. Table 7 reports the results from this analysis. For rapes, lesser-included chargers of other sex-offenses remain relatively constant while rapes with lesser-included charges of burglary and theft crimes increase. Similarly, assaults with theft related lesser-included-charges increase while assaults with no lesser-included charges decline. This combined with the increase in robberies is suggestive of the fact that at least some individuals may be switching from committing burglary to robbery or may be more willing to commit a rape or assault during the course of a burglary.

Additionally, the compositional explanation for behavior does not diminish the need for

[19] This claim is based on estimating equation (7) separately for violent and non-violent offenses.
[20] This evidence is consistent with results in Shepherd (2001) which finds reduced levels of triggering offenses in a

marginal deterrence. If offenders who commit violent crimes receive higher payoffs for these crimes, then harsher penalties are still required to deter these criminals. Thus coincident with this alternative theory is an alternative justification for maintaining a penalty gradient: proportional sentencing is necessary to ensure that violent crimes are deterred. This bears directly on the cost-effectiveness of a an enhanced sentencing policy, but requires a relative valuation of violent, non-violent, and incarceration costs which are beyond the scope of this paper. However, if this explanation of behavior is true, then Three Strikes did not encourage any crime that would not have occurred in the absence of Three Strikes, it simply failed to deter violent crime.

5. CONCLUDING REMARKS

This study presents evidence that an increase in the severity of penalties for all crimes can generate competing effects. On the one hand, as intended, such a policy appears to reduce participation in criminal activity. In the case of habitual offender legislation such as Three-Strikes, this effect appears to be especially concentrated among repeat offenders. Such an effect produces unambiguous social gains. On the other hand, the broad enhancement of penalty severity reduces the cost of more severe crimes (such as violent crimes) relative to less severe crimes (such as non-violent crimes). This produces a social cost for societies who have a distaste for more severe crimes. Thus, while the overall effect of a sentence enhancement may be a reduction in crime levels, the cost in terms of a higher fraction of violent crimes may be unpalatable. This study provides additional evidence that criminals, when faced with harsh penalties in one area, may migrate to other less costly locations. This result is especially important when considering the efficacy of crime laws which are passed at the state level. If these laws do littler more than beggar thy neighbor by shifting the worst criminals across the border, then harsh sentencing regimes may not produce the anticipated reduction in criminal participation but rather will only serve to shift criminal activity across borders.

In order to better compare the participation, severity, and migration effects, I attempt to quantify and monetize the estimates of crimes reduced. Based on the estimates presented in this paper, it appears that on average 148,000 non-violent crimes and 74,000 violent crimes were not committed each year due to the participation effect of the law change. However, the escalating severity due to the removal of proportional sentencing resulted in 21,000 additional violent crimes annually. Using monetized estimates of the cost of crime by the Bureau of Justice Statistics, I estimate that this amounts

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structural model using aggregate data.

to $193 million dollars.[21] A legislative analysis of Three Strikes estimated that the operating costs resulting from Three Strikes law is nearly one-half billion dollars annually.[22] Thus while Three-Strikes does appear to be effective at deterring crime, the substitution from non-violent to violent crime and the high cost of incarceration make the law a somewhat costly strategy to reduce crime levels.

Separate from the within state effectiveness of Three-Strikes is the effect of such harsh penalties on other states. Three Strikes appears to have imposed 50,000 crimes on other states due to the migration of criminals out of California. Such an affect appears to have been largely unanticipated and may be extremely costly for other states, especially if the destination states are ill-equipped to handle an influx of criminals. This effect is particularly important when considering the types of criminal justice policies advocated because most of these policies occur at the state level. If these laws are successful in part because they transfer criminal activity across borders then while politically successfully they maybe socially costly.

The evidence provided in this study highlights the responsiveness of criminals, especially repeat offenders, to incentive-based penalty schemes. Individuals appear to choose both whether to participate as well as the form of the participation as a function of the penalty structure. While it may be surprising that criminals respond so sharply to incentives, sociological evidence (e.g. Shafer) suggests that criminals are aware of the sentencing structure and their own eligibility for punishment. The nuanced responsiveness of criminals to smaller enhancements and the effects of strong enhancements that preserve proportionality with respect to severity are not estimated in this paper and left as an area of future research.

[21] Cost estimates are weighted average of estimated costs for types of crimes from Miller, Cohen, and Wiersema updated to 2001 dollars.

[22] These estimates are substantially smaller than the estimates presented in previous work (such as Greenwood et al.) The primary reason for the difference is the effect of discretion (i.e. the use of judicial discretion to dismiss prior strikes and variation among counties in willingness to prosecute offenders under the Three Strikes law.)

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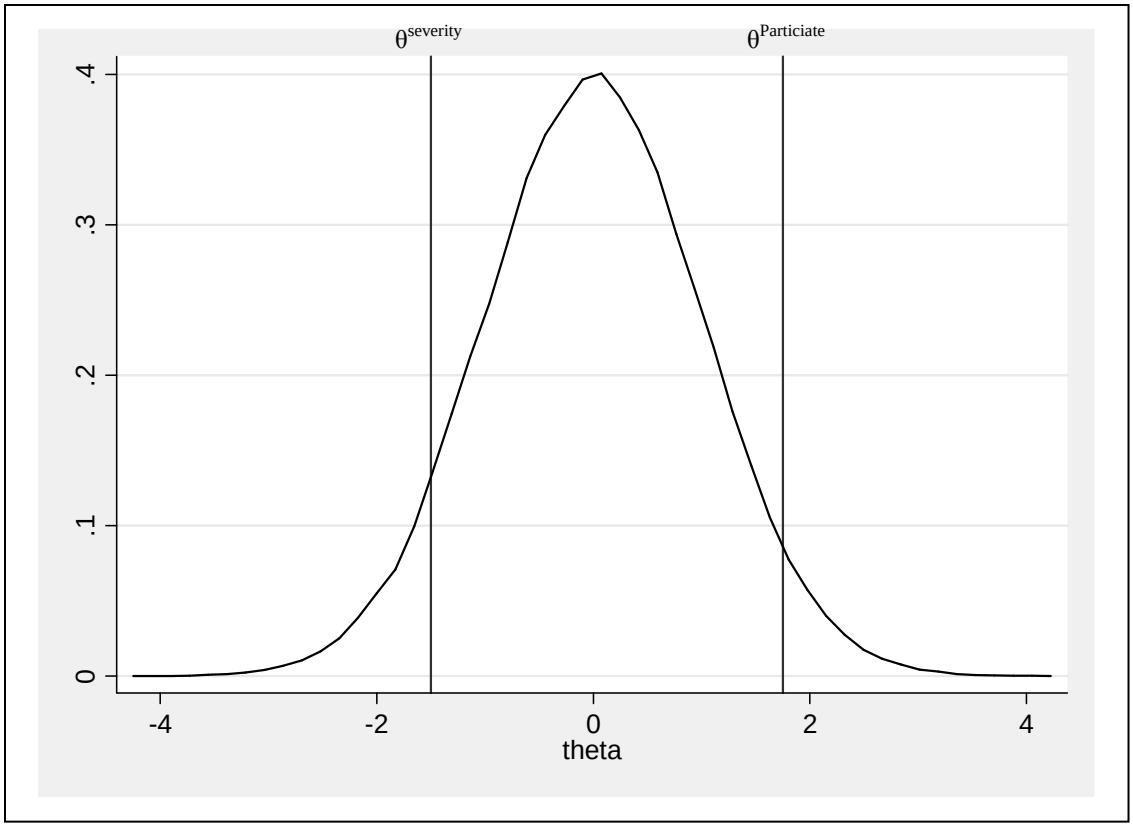

Figure 1. Example of Distribution of Individual Cost Parameter, θ, and Cut-Off Values

Table 1: California Three Strikes Record Aggravating Offenses

Violent Felonies	Murder	Murder voluntary manslaughter
	Sex Offenses	Rape Sodomy by force, violence, duress, menace, or threat of injury Oral copulation by force, violence, duress, menace, or threat of injury Lewd acts on a child under 14 Continuous sexual abuse of a child
	Assault	Attempted murder Assault with the intent to commit mayhem, rape, sodomy, or oral copulation
	Robbery	Any Robbery
	Other Violent Crimes	Mayhem. Any felony in which the defendant inflicts great bodily injury on any person Kidnapping Carjacking Arson which results in Bodily Harm Exploding device with intent to injure or kill
Serious Felonies (Non-Violent)	Property Crimes	Arson Burglary of a Home or Dwelling Grand Theft
	Drug Offenses	Drug Sales to Minors Drug Trafficking
	Other Felonies	Any felony in which the defendant uses a firearm Threats to victims or witnesses Extortion Any felony punishable by death or imprisonment for life.

Source: California Penal Code, Part 1. Title 16. General Provisions 667

Table 2: Summary statistics of in sample and total population

	1-Strike Eligible	*2-Strike Eligible*	*3-Strike Eligible*
N	12,685	2,788	1,659
Sex			
Male	67%	71%	87%
Race			
Black	31%	35%	45%
Hispanic	41%	32%	36%
White	22%	29%	17%
Current Crime			
Violent	31%	37%	43%
Property	32%	29%	31%
Drugs	25%	24%	17%
Other	12%	10%	9%
Prior Criminal History			
Number of Prior Arrests	1.1	2.6	4.2
Number of Prior Felony Convictions	0.7	2.1	3.7
Number of Violent Convictions	0	0.8	1.2
Current Offense			
Convicted on current offense	24%	27%	44%
Receive Life Sentence	0.3	0.7	5.3
Average Sentence Length (in months)	22	45	67
Future Criminal Activity			
Probability Recidivate within 2 years	53%	43%	41%
Number of Future Convictions	1.3	2.4	2.2
Number of Future Violent Convictions	0.6	1.0	1.1

Note: Life sentences are entered as 25 years for average sentence length computation. Violent Crimes include murder, rape, assault and robbery. Property crimes include

Table 3: Median Sentences in Pre and Post Three Strikes Period, by Crime Type and Offender Strikes

	1990-1993 (Pre-Three Strikes)	*1994-1999 (Post-Three Strikes)*
Panel A: First Strike Eligible		
Murder	20 years	20 years
Rape	4.9 years	5 years
Assault	4.3 years	3 years, 6 months
Robbery	3 years	3 years
Burglary	9 months	1 year
Theft	6 months	9 months
Drugs	9 months	1 years 2 months
Panel B: Second Strike Eligible		
Murder	23 years	27 years
Rape	5 years	9 years
Assault	1 year	2 years, 5 months
Robbery	3years 5 months	6years 5 months
Burglary	1year 3 months	3 years
Theft	1 year	2 years, 8 months
Drugs	1 year	4 years
Panel C: Third Strike Eligible		
Murder	20 years	Life
Rape	9 years	30 years
Assault	6.5 years	23 years
Robbery	4 years	21 years
Burglary	2 years	22 years
Theft	1.2	26 years
Drugs	2	25 years

Source: Three County Survey of Arrest Record in Los Angeles, San Diego, and San Francisco, 1990-1999. Offenders who committed "other" offenses are excluded from the sample. All sentences are truncated at 60 years. Offenders with missing sentencing data are omitted. Sample size is 17,264.

Table 4. Linear Estimates of Probability of Recidivism by Strike Eligibility

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pr(Commit Crime within 2 years)		All Three Cities		Los Angeles		San Diego		San Francisco	
Dependent Variable Mean		0.49		0.51		0.46		0.47	
*after*2strikes*	-0.1046**	- 0.0931**	-0.0814*	-0.1387**	-0.1143**	-0.0742**	-0.0651*	-0.0675*	-0.0712*
	(0.0415)	(0.0461)	(0.0418)	(0.0621)	(0.0678)	(0.0411)	(0.0440)	(0.0405)	(0.0410)
*after*3strikes*	-0.1822**	-0.1434*	-0.1411**	-0.2214***	-0.1685***	-0.1254**	-0.1011**	-0.1119***	-0.1412*
	(0.0713)	(0.0793)	(0.0721)	(0.0443)	(0.0471)	(0.0493)	(0.0471)	(0.0409)	(0.0771)
2 strikes	0.0462	0.0251	0.0264	0.0532	0.0546	0.0324	0.0438	0.0178	0.0176
(=1 if second strike eligible)	(0.0317)	(0.0165)	(0.0171)	(0.0417)	(0.0376)	(0.0456)	(0.0379)	(0.0365)	(0.0326)
3 strikes	0.0643	0.0471	0.0238	0.0526	0.0564	0.0471	0.0496	0.0784	0.0464
(=1 if third strike eligible)	(0.0436)	(0.0795)	(0.0624)	(0.0757)	(0.0795)	(0.0795)	(0.0775)	(0.0736)	(0.0714)
County Fixed Effects	Y	Y	Y	N	N	N	N	N	N
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Controls for Economic Characteristics [a]	N	N	Y	Y	Y	Y	Y	Y	Y
Controls for Police and Judicial Spending [b]	N	N	Y	Y	Y	Y	Y	Y	Y
Estimation Strategy [c]	OLS	IV	IV	OLS	IV	OLS	IV	OLS	IV
Observations	17,264	17,264	17,264	12,514	12,514	2,829	2,829	1,921	1,921

Note: Results that are significant at .05 (0.1, 0.01) are reported with **, (*, ***). Coefficients reported are an indicator variable for individuals who are second strike eligible, and an interaction term between the year indicator variables and strikes indicator variables. Also included in all specifications but not reported are variables for age, race, ethnicity, sex, felony rate per criminal year, and prior criminal history. Prior criminal history variable is a vector of variables counting the number of times an individual was convicted of a felony by crime category. Crime categories include murder, rape, assault, robbery, burglary, theft, drug crimes, and other felonies. Standard errors, reported in parentheses, are clustered by county of arrest

a. Economic Characteristics include county-year measures of unemployment rate and percent of population below poverty.

b. Police and Judicial spending controls include county-year expenditures on police, prosecution, public defense, and judiciary.

c. Instrumental variables estimates instrument for prior criminal history using arrest for offenses.

Table 5. Linear estimates of the Probability of Committing Crime outside of California by Strike Eligibility

	(1)	(2)	(3)	(4)	(5)	(6)
	Pr(Commit Crime in CA within 2 years)			Pr(Commit Crime Outside CA within 2 yrs | Commit Crime)		
Dependent Variable Mean	0.43			0.13		
*after*2strikes*	-0.1272**	- 0.0882**	-0.0866*	0.0692**	0.0614**	0.0611*
	(0.0578)	(0.0465)	(0.0464)	(0.0299)	(0.0312)	(0.0316)
*after*3strikes*	-0.2165**	-0.1621**	-0.1599**	0.0918**	0.0874*	0.0867*
	(0.0779)	(0.0822)	(0.0791)	(0.0414)	(0.0466)	(0.043)
2 strikes	0.0652	0.0541	0.0610	0.0031	0.0061	0.0059
(=1 if second strike eligible)	(0.0465)	(0.0454)	(0.0465)	(0.0315)	(0.0376)	(0.0371)
3 strikes	0.0864*	0.0412	0.0431	0.0093	0.0167	0.0163
(=1 if third strike eligible)	(0.0521)	(0.0678)	(0.0645)	(0.0516)	(0.0613)	(0.0615)
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Controls for Economic Characteristics [a]	N	N	Y	N	N	Y
Controls for Police and Judicial Spending [b]	N	N	Y	N	N	Y
Estimation Strategy [c]	OLS	IV	IV	OLS	IV	IV
Observations	17,264					

Note: Results that are significant at .05 (0.1, 0.01) are reported with **, (*, ***). Coefficients reported are an indicator variable for individuals who are second strike eligible, and an interaction term between the year indicator variables and strikes indicator variables. Also included in all specifications but not reported are variables for age, race, ethnicity, sex, felony rate per criminal year, and prior criminal history. Prior criminal history variable is a vector of variables counting the number of times an individual was convicted of a felony by crime category. Crime categories include murder, rape, assault, robbery, burglary, theft, drug crimes, and other felonies. Standard errors, reported in parentheses, are clustered by county of arrest

a. Economic Characteristics include county-year measures of unemployment rate and percent of population below poverty.

b. Police and Judicial spending controls include county-year expenditures on police, prosecution, public defense, and judiciary.

c. Instrumental variables estimates instrument for prior criminal history using arrest for offenses.

Table 6. Linear Estimates of the Change in Crime Severity by Strike Eligibility

(Probability of committing *Y* | Committing a Crime)	*(1)* Violent crime	*(2)* murder	*(3)* rape	*(4)* assault	*(5)* robbery	*(6)* burglary	*(7)* theft	*(8)* drugs
Dependent Variable Mean	0.34	0.01	0.04	0.14	0.15	0.14	0.09	0.27
*after*2strikes*	0.0412**	-0.0048	0.0432**	0.0289*	0.0593**	-0.0679***	-0.0208	-0.0147
	(0.0205)	(0.0031)	(0.0192)	(0.0125)	(0.0237)	(0.0260)	(0.0296)	(0.0211)
*after*3strikes*	0.0956***	-0.0037	0.0526	0.0541*	0.1214*	-0.0680*	-0.794*	0.0713
	(0.0295)	(0.0021)	(0.0221)	(0.0236)	(0.0525)	(0.0168)	(0.0628)	(0.0448)
2 strikes	-0.0334	-0.0014	0.0267	0.0947	0.0372	-0.0107	0.1147	-0.0461
(=1 if second strike eligible)	(0.0290)	(0.0017)	(0.0342)	(0.1016)	(0.0244)	(0.0158)	(0.0949)	(0.0714)
3 strikes	-0.0679	-0.001	0.0129	-0.0207	0.0210*	-0.0012	0.1749	0.0160
(=1 if third strike eligible)	(0.0469)	(0.0037)	(0.0645)	(0.0581)	(0.0436)	(0.0361)	(0.0688)	(0.0202)
County Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Controls for Economic Characteristics[a]	Y	Y	Y	Y	Y	Y	Y	Y
Controls for Police and Judicial Spending[b]	Y	Y	Y	Y	Y	Y	Y	Y
Observations								

Note: Results that are significant at .05 (0.1, 0.01) are reported with **, (*, ***). Coefficients reported are an indicator variable for individuals who are second strike eligible, and an interaction term between the year indicator variables and strikes indicator variables. Also included in all specifications but not reported are variables for age, race, ethnicity, sex, felony rate per criminal year, and prior criminal history. Prior criminal history variable is a vector of variables counting the number of times an individual was convicted of a felony by crime category. Crime categories include murder, rape, assault, robbery, burglary, theft, drug crimes, and other felonies. Standard errors, reported in parentheses, are clustered by county of arrest

a. Economic Characteristics include county-year measures of unemployment rate and percent of population below poverty.

b. Police and Judicial spending controls include county-year expenditures on police, prosecution, public defense, and judiciary.

Table 7. Linear Estimates of Lesser Included Charges (LIC) for Rape and Assault, by Strike Eligibility

	Overall Effect (all LIC)	*other LIC*	*burglary or theft LIC*	*Drug LIC*†	*no LIC*
Panel A: Rape Sub-Categories					
Dependent Variable Mean	0.042	0.0223	0.0101	--	0.003
*after*2strikes*	0.0432**	0.0182	0.0331*	--	-0.007
	(0.0192)	(0.0132)	(0.0196)		(0.024)
*after*3strikes*	0.0526**	0.0112	0.0475*	--	0.0119
	(0.0221)	(0.0175)	(0.0283)		(0.0332)
Panel B: Assault Sub-Categories					
Dependent Variable Mean	0.144	0.017	0.029	0.036	0.062
*after*2strikes*	0.0289*	-0.003	0.0317*	0.0253	-0.0251*
	(0.0125)	(0.0163)	(0.0171)	(0.0183)	(0.0142)
*after*3strikes*	0.0541*	-0.012	0.0553*	0.0413	-0.0305
	(0.0236)	(0.0261)	(0.0331)	(0.0292)	(0.0274)
Observations	17,264	17,264	17,264	17,264	17,264
County Fixed Effects	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y
Controls for Economic Characteristics [a]	Y	Y	Y	Y	Y
Controls for Police and Judicial Spending [b]	Y	Y	Y	Y	Y

Note: Results that are significant at .05 (0.1, 0.01) are reported with **, (*, ***). Coefficients reported are an indicator variable for individuals who are second strike eligible, and an interaction term between the year indicator variables and strikes indicator variables. Also included in all specifications but not reported are variables for age, race, ethnicity, sex, felony rate per criminal year, and prior criminal history. Prior criminal history variable is a vector of variables counting the number of times an individual was convicted of a felony by crime category. Crime categories include murder, rape, assault, robbery, burglary, theft, drug crimes, and other felonies. Standard errors, reported in parentheses, are clustered by county of arrest.

†There were insufficient numbers of rape offenses with lesser-included-charges related to drugs for specification.

a. Economic Characteristics include county-year measures of unemployment rate and percent of population below poverty.

b. Police and Judicial spending controls include county-year expenditures on police, prosecution, public defense, and judiciary.

Appendix Table 1: Crime Categories and Definitions

Crime	*Definition*	*Included Offenses (California Penal Code Sections)*
Murder	All willful (non-negligent) killing of one human being by another	Murder (§187) Voluntary Manslaughter (§192a) Involuntary Manslaughter (§192b) Gross Vehicular Manslaughter while intoxicated (§193.5)
Rape	Forcible sexual contact	Forcible rape, spousal rape (§261, §262) Forcible Sodomy or Oral Copulation (§286, 288a) Sexual assault with an object (§289) Lewd or Lascivious acts of continuous sex abuse of a child (§288, 288.5) Sexual battery (§243.4)
Assault	Unlawful attack by one person upon another for the purpose of inflicting severe or aggravated bodily injury, usually accompanied by the use of a weapon or by means likely to produce death or great bodily harm.	Mayhem, Aggravated Mayhem (§203, 205) Torture (§206) Assault with intent to commit Mayhem or sex offenses (§220) Assault with Caustic Chemicals or Taser gun (§244, 244.5) Assault with deadly weapon or by force (§245) Infliction of injury on spouse, cohabitee or parent of child (§273.5)
Robbery	The taking or attempting to take anything of value from the care, custody or control of a person or persons by force or threat of force or violence and/or by putting the victim in fear.	Robbery (§211) First and Second Degree Robbery (§212.5) Train Robbery, Car Jacking (§214, 215)
Burglary	The unlawful entry of a structure to commit a felony or theft. The use of force to secure entry is often a part of burglary but is not required for a burglary charge.	Burglary (§459) Looting (§463)
Theft	The unlawful taking, carrying, leading or riding away of property from the possession or constructive possession of another in which no use of force, violence or fraud occurs.	Larceny (§484-502.9) Motor vehicle theft (§10851)
Drugs	The unlawful possession, sale, use, growing, manufacturing, and making of narcotic drugs. The relevant substances include: opium or cocaine and their derivatives (morphine, heroin, codeine); marijuana; synthetic narcotics (Demerol, methadone); and dangerous non-narcotic drugs (barbiturates)	Any individual subject to California Major Narcotic Vendors Prosecution Law (§13883) who is under arrest for violation of the Health and Safety Code Narcotics (§11350-11356.5) Controlled Substances formerly classified as restricted dangerous drugs (§11377-11382.5)

Note: Definitions from Uniform Crime Reporting Handbook. Not all potentially included offenses are included in the sample

Appendix Table 2. Sensitivity of Linear Probability Estimates of Length of time for Probability of Recidivate

	(1)	(2)	(3)	(4)	(5)	(6)
	Pr(Commit Crime in CA within 1 years)			Pr(Commit Crime in CA within 3 years)		
Dependent Variable Mean	0.43			0.13		
*after*2strikes*	-0.1361**	- 0.1010**	-0.1002*	-0.1125**	- 0.0914*	-0.0913*
	(0.0498)	(0.0522)	(0.0521)	(0.0263)	(0.0511)	(0.0499)
*after*3strikes*	-0.2614**	-0.2211**	-0.2159**	-0.1832**	-0.1632**	-0.1613**
	(0.0361)	(0.0672)	(0.0671)	(0.0323)	(0.0512)	(0.0528)
2 strikes	0.0553*	0.0532	0.0513	0.0352	0.0332	0.0388
(=1 if second strike eligible)	(0.0311)	(0.0433)	(0.0421)	(0.0263)	(0.0613)	(0.0625)
3 strikes	0.0815	0.0741	0.0713	0.0963**	0.0716	0.0713
(=1 if third strike eligible)	(0.0492)	(0.0568)	(0.0561)	(0.0273)	(0.0512)	(0.0555)
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Controls for Economic Characteristics [a]	N	N	Y	N	N	Y
Controls for Police and Judicial Spending [b]	N	N	Y	N	N	Y
Estimation Strategy [c]	OLS	IV	IV	OLS	IV	IV

Note: Results that are significant at .05 (0.1, 0.01) are reported with **, (*, ***). Reported values are marginal effects evaluated at the mean. Column (1) dependent variable is an indicator for whether the current offense is violent. Violent offenses are murder, sex offenses, assault and robbery. The dependent variables for columns (2)-(8) are indicator variables for whether an individual committed a given crime type (types are murder, sex offenses, assault, robbery, burglary, theft, drugs). Coefficients reported are an indicator variable for individuals who are second strike eligible, and an interaction term between the year indicator variables and strikes indicator variables. Also included in all specifications but not reported are variables for age, race, ethnicity, sex, felony rate per criminal year, and prior criminal history. Prior criminal history variable is a vector of variables counting the number of times an individual was convicted of a felony by crime category. Crime categories include murder, rape, assault, robbery, burglary, theft, drug crimes, and other felonies. Standard errors, reported in parentheses, are clustered by county of arrest

a. Economic Characteristics include county-year measures of unemployment rate and percent of population below poverty.

b. Police and Judicial spending controls include county-year expenditures on police, prosecution, public defense, and judiciary.

c. Instrumental variables estimates instrument for prior criminal history using arrest for offenses.

Appendix Table 3. Sensitivity of Linear Probability Estimates for Sample Time Frame

	(1)	(2)	(3)	(4)	(5)	(6)
	Pr(Commit Crime in CA within 2 years)					
Dependent Variable Mean	0.43		0.31		0.45	
*after*2strikes*	-0.1046**	-0.0814*	-0.1183**	-0.0913	-0.1099**	-0.0899*
	(0.0415)	(0.0418)	(0.0515)	(0.0564)	(0.0451)	(0.0513)
*after*3strikes*	-0.1822**	-0.1411**	-0.1316**	-0.1292*	-0.1786**	-0.1611**
	(0.0713)	(0.0721)	(0.0588)	(0.0769)	(0.0727)	(0.0783)
2 strikes	0.0462	0.0264	0.0325	0.0329	0.0511	0.0416
(=1 if second strike eligible)	(0.0317)	(0.0171)	(0.0235)	(0.0372)	(0.0361)	(0.0400)
3 strikes	0.0643	0.0238	0.0734	0.0226	0.0701	0.0611
(=1 if third strike eligible)	(0.0436)	(0.0624)	(0.0481)	(0.0143)	(0.0511)	(0.0649)
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Controls for Economic Characteristics [a]	N	Y	N	Y	N	Y
Controls for Police and Judicial Spending [b]	N	Y	N	Y	N	Y
Estimation Strategy [c]	OLS	IV	OLS	IV	OLS	IV
Sample Used for Analysis[d]	1990-1999 At least 1 prior >90, All priors <94	1990-1999 At least 1 prior >90, All priors <94	1990-1999 No restriction on date of prior	1990-1999 No restriction on date of prior	1990-1996 At least 1 prior >90, All priors <94	1990-1996 At least 1 prior >90, All priors <94

Note: Results that are significant at .05 (0.1, 0.01) are reported with **, (*, ***). Reported values are marginal effects evaluated at the mean. Column (1) dependent variable is an indicator for whether the current offense is violent. Violent offenses are murder, sex offenses, assault and robbery. The dependent variables for columns (2)-(8) are indicator variables for whether an individual committed a given crime type (types are murder, sex offenses, assault, robbery, burglary, theft, drugs). Coefficients reported are an indicator variable for individuals who are second strike eligible, and an interaction term between the year indicator variables and strikes indicator variables. Also included in all specifications but not reported are variables for age, race, ethnicity, sex, felony rate per criminal year, and prior criminal history. Prior criminal history variable is a vector of variables counting the number of times an individual was convicted of a felony by crime category. Crime categories include murder, rape, assault, robbery, burglary, theft, drug crimes, and other felonies. Standard errors, reported in parentheses, are clustered by county of arrest

a. Economic Characteristics include county-year measures of unemployment rate and percent of population below poverty.

b. Police and Judicial spending controls include county-year expenditures on police, prosecution, public defense, and judiciary.

c. Instrumental variables estimates instrument for prior criminal history using arrest for offenses.

d. Sample used in the analysis of the paper spans 1990-1999 and in order to be included requires offenders

Appendix Table 4. Falsification Checks of Probability of Current Crime Type for Second and Third Strike Eligible Arrestees, 1990-1993

	(1) Violent crime	*(2)* murder	*(3)* rape	*(4)* assault	*(5)* robbery	*(6)* burglary	*(7)* theft	*(8)* drugs
*(after 1992)*2strikes*	0.0011	-0.0048	0.0015	0.0164	0.0176	-0.0226	-0.0046	-0.0029
	(0.0256)	(0.0073)	(0.0162)	(0.0123)	(0.0313)	(0.0322)	(0.0267)	(0.0201)
*(after 1992)*3strikes*	0.0064	-0.0037	0.0032	0.0251	0.0356	-0.0327*	-0.0098	0.0052
	(0.0361)	(0.0092)	(0.0120)	(0.0232)	(0.0785)	(0.0331)	(0.0538)	(0.0451)
2 strikes	0.0042	-0.0014	0.0267	0.0123	0.0354	-0.0153	0.0794	-0.0171
(=1 if second strike eligible)	(0.0132)	(0.0061)	(0.0342)	(0.0165)	(0.0451)	(0.0298)	(0.0949)	(0.0645)
3 strikes	0.0263	-0.001	0.0178	-0.0236	0.0326	-0.0312	0.0189	0.0245
(=1 if third strike eligible)	(0.0236)	(0.0086)	(0.0412)	(0.0592)	(0.0476)	(0.0301)	(0.0465)	(0.0465)
County Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Controls for Economic Characteristics	N	N	N	Y	N	N	N	Y
Controls for Police and Judicial Spending	N	N	N	Y	N	N	N	Y
Offender with criminal history pre-1990	N	Y	N	N	N	Y	N	N
All Offenders	N	N	Y	N	N	N	Y	N
Observations								

Note: Results that are significant at .05 (0.1, 0.01) are reported with **, (*, ***). Reported values are marginal effects evaluated at the mean. Column (1) dependent variable is an indicator for whether the current offense is violent. Violent offenses are murder, sex offenses, assault and robbery. The dependent variables for columns (2)-(8) are indicator variables for whether an individual committed a given crime type (types are murder, sex offenses, assault, robbery, burglary, theft, drugs). Coefficients reported are an indicator variable for individuals who are second strike eligible, and an interaction term between the year indicator variables and strikes indicator variables. Also included in all specifications but not reported are variables for age, race, ethnicity, sex, felony rate per criminal year, and prior criminal history. Prior criminal history variable is a vector of variables counting the number of times an individual was convicted of a felony by crime category. Crime categories include murder, rape, assault, robbery, burglary, theft, drug crimes, and other felonies. Standard errors, reported in parentheses, are clustered by county of arrest

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